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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Mobile Mining Machine Having Tilted Swing Axis

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Notice: This application is as filed and may therefore contain an incomplete specification.

CLAIMS

1. A mobile mining machine for cutting a tunnel in rock, comprising:

a wheel-like cutterhead assembly means for cutting rock, said cutterhead assembly means having a subtantially horizontal axis of rotation and having multiple peripherally mounted roller cutter units;

rotation means for rotating said cutterhead assembly means about its horizontal axis;

pitch boom assembly means supporting said cutterhead assembly means, said pitch boom assembly means causing vertical movement of said cutterhead assembly means;

frame means having a longitudinal axis and a vertical axis perpendicular to the longitudinal axis;

swing boom assembly means supported by said frame means and supporting said pitch boom assembly means, said swing boom assembly means having a pivot axis oriented at an acute angle from the vertical axis of said frame means, said swing boom assembly causing lateral movement of said cutterhead assembly means and said pitch boom assembly means with respect to said frame means;

thrust means for thrusting forward as a unit said frame means, said swing boom assembly means, said pitch boom assembly means, and said cutterhead assembly means; and

holding means for anchoring said mobile mining machine in a tunnel during activation of said thrust means, said holding means including transport means for locomotion of said mobile mining machine.

2. The mobile mining machine of claim 1, wherein said holding means comprises:

a pair of gripper cylinders interconnected by a floating gripper carrier weldment having an opening in which resides the aft portion of said frame means for relative sliding movement of said floating gripper carrier weldment

and said aft portion of said frame means, each of said gripper cylinders having an upper rod with a roof anchor shoe thereon and a lower rod with a floor anchor shoe thereon, said thrust means interconnecting said frame means and said holding means whereby extension of said gripper cylinder braces said holding means against a tunnel and extension of said thrust means moves forward said frame means relative to said holding means as said aft portion of said frame means slides in said floating gripper carrier weldment, and retraction of said gripper cylinders and of said thrust means moves forward said holding means relative to said frame means as said floating gripper carrier weldment slides along said aft portion of said frame means.

3. The mobile mining machine of claim 2, wherein said main frame further comprises:

gripper grooves longitudinally disposed on said aft portion of said frame means, said gripper grooves guiding the relative sliding movement of said floating gripper carrier weldment of said holding means and of said aft portion of said frame means.

4. The mobile mining machine of claim 2, wherein said upper rods of said gripper cylinders are independently extendable and retractable with respect to said lower rods of said gripper cylinders for altering the vertical orientation of said frame means relative to a tunnel.

5. The mobile mining machine of claim 1, wherein said holding means includes a rolling roof stabilizer and a rear gripper assembly means, said rolling roof stabilizer comprising:

a stabilizer support attached to the top of said frame means;

a plate slidably secured to said stabilizer support by roller means;

plate anchor means between said frame means and said stabilizer support for bracing said plate against the roof of the tunnel upon energizing said plate anchor means;

link means connecting said plate to said rear gripper assembly means whereby (i) said frame means and said stabilizer support move forward on said roller means and relative to said plate upon energizing of said plate anchor means to brace said plate against the roof of the tunnel, anchoring of said rear gripper assembly means in the tunnel, and thrusting of said thrust means, and (ii) said link means moves said plate forward on said roller means during forward movement of said rear gripper assembly means and relative to said stabilizer support and said frame means upon retraction of said plate anchor means, said rear gripper assembly means and said thrust means.

6. The mobile mining machine of claim 1, wherein the acute angle of the pivot axis of said swing boom assembly means is between about 10° and about 45° from the vertical axis of said frame means.

7. The mobile mining machine of claim 6, wherein the acute angle of the pivot axis of said swing boom assembly means is about 30° from the vertical axis of said frame means.

8. A mobile mining machine for cutting a tunnel in rock, comprising:

a wheel-like cutterhead assembly means for cutting rock, said cutterhead assembly means having a substantially horizontal axis of rotation and having multiple peripherally mounted roller cutter units;

rotation means for rotating said cutterhead assembly means about its horizontal axis;

pitch boom assembly means supporting said cutterhead assembly means, said pitch boom assembly means causing vertical movement of said cutterhead assembly means;

frame means having a longitudinal axis and a vertical axis perpendicular to the longitudinal axis;

swing boom assembly means supported by said frame means and supporting said pitch boom assembly means, said swing boom assembly means having a pivot axis, said swing boom assembly causing lateral movement of said cutterhead assembly means and said pitch boom assembly means with respect to said frame means;

removable tilt adaptor means between said swing boom assembly means and said frame means so that the pivot axis of said swing boom assembly is oriented at an acute angle from the vertical axis of said frame means when said removable tilt adaptor is present, and the pivot axis of said swing boom assembly means is substantially parallel to the vertical axis of said frame means when said removable tilt adaptor means is absent;

thrust means for thrusting forward as a unit said frame means, said swing boom assembly means, said pitch boom assembly means and said cutterhead assembly means; and

holding means for anchoring said mobile mining machine in a tunnel during activation of said thrust means, said holding means including transport means for locomotion of said mobile mining machine.

9. The mobile mining machine of claim 8, wherein said holding means comprises:

a pair of gripper cylinders interconnected by a floating gripper carrier weldment having an opening in which resides the aft portion of said frame means for relative

sliding movement of said floating gripper carrier weldment and said aft portion of said frame means, each of said gripper cylinders having an upper rod with a roof anchor shoe thereon and a lower rod with a floor anchor shoe thereon, said thrust means interconnecting said frame means and said holding means whereby extension of said gripper cylinder braces said holding means against the tunnel wall and extension of said thrust means moves forward said frame means relative to said holding means as said aft portion of said frame means slides in said floating gripper carrier weldment, and retraction of said gripper cylinders and of said thrust means moves forward said holding means relative to said frame means as said floating gripper carrier weldment slides along said aft portion of said frame means.

10. The mobile mining machine of claim 9, wherein said frame means further comprises:

gripper grooves longitudinally disposed on said aft portion of said frame means, said gripper grooves guiding the relative sliding movement of said floating gripper carrier weldment of said holding means and of said aft portion of said frame means.

11. The mobile mining machine of claim 9, wherein said upper rods of said gripper cylinders are independently extendable and retractable with respect to said lower rods of said gripper cylinders for altering the vertical orientation of said frame means relative to the tunnel.

12. The mobile mining machine of claim 8, wherein said holding means includes a rolling roof stabilizer and a rear gripper assembly means, said rolling roof stabilizer comprising:

a stabilizer support attached to the top of said frame means;

a plate slidably secured to said stabilizer support by roller means;

plate anchor means between said frame means and said stabilizer support for bracing said plate against the roof of the tunnel upon energizing said plate anchor means;

link means connecting said plate to said rear gripper assembly means whereby (i) said frame means and said stabilizer support move forward on said roller means and relative to said plate upon energizing of said plate anchor means to brace said plate against the roof of the tunnel, anchoring of said rear gripper assembly means in the tunnel, and thrusting of said thrust means, and (ii) said link means moves said plate forward on said roller means during forward movement of said rear gripper assembly means and relative to said stabilizer support and said frame means upon retraction of said plate anchor means, said rear gripper assembly means and said thrust means.

13. The mobile mining machine of claim 8, wherein the acute angle of the pivot axis of said swing boom assembly means is between about 10° and about 45° from the vertical axis of said frame means.

14. The mobile mining machine of claim 13, wherein the acute angle of the pivot axis of said swing boom assembly means is about 30° from the vertical axis of said frame means.

15. A mobile mining machine for cutting a tunnel in rock, comprising:

a cutterhead for cutting rock, said cutterhead having a substantially horizontal axis of rotation and having multiple peripherally mounted roller cutter units;

rotation means for rotating said cutterhead about its horizontal axis;

a pitch boom supporting said cutterhead, said pitch boom causing vertical movement of said cutterhead;

a main frame having a longitudinal axis and a vertical axis perpendicular to the longitudinal axis;

a swing boom supported by said main frame and supporting said pitch boom, said swing boom having a pivot axis oriented at an acute angle from the vertical axis of said main frame, said swing boom causing lateral movement of said cutterhead and said pitch boom with respect to said main frame;

thrust means for thrusting forward as a unit said main frame, said swing boom, said pitch boom and said cutterhead; and

holding means for anchoring said mobile mining machine in a tunnel during actuation of said thrust means, said holding means including a pair of gripper cylinders interconnected by a floating gripper carrier weldment having an opening in which resides the aft portion of said main frame for relative sliding movement of said floating gripper carrier weldment and said aft portion of said main frame, each of said gripper cylinders having an upper rod with a roof anchor shoe thereon and a lower rod with a floor anchor shoe thereon, said thrust means interconnecting said main frame and said holding means whereby extension of said gripper cylinder braces said holding means against a tunnel and extension of said thrust means moves forward said main frame relative to said holding means as said aft portion of said main frame slides in said floating gripper carrier weldment, and retraction of said gripper cylinders and of said thrust means moves forward said holding means relative to said main frame as said floating gripper carrier

weldment slides along said aft portion of said main frame, said holding means including transport means for locomotion of said mobile mining machine.

16. The mobile mining machine of claim 15, wherein said main frame further comprises:

gripper grooves longitudinally disposed on said aft portion of said main frame, said gripper grooves guiding the relative sliding movement of said floating gripper carrier weldment of said holding means and of said aft portion of said main frame.

17. The mobile mining machine of claim 15, wherein said upper rods of said gripper cylinder are independently extendable and retractable with respect to said lower rods of said gripper cylinders for altering the vertical orientation of said main frame relative to a tunnel.

18. The mobile mining machine of claim 17, further including a rolling roof stabilizer, said rolling roof stabilizer comprising:

a stabilizer support attached to the top of said main frame;

a plate slidably secured to said stabilizer support by roller means;

plate anchor means between said main frame and said stabilizer support for bracing said plate against the roof of the tunnel upon energizing said plate anchor means; and

link means connecting said plate to said holding means whereby (i) said main frame and said stabilizer support move forward on said roller means and relative to said plate upon energizing of said plate anchor means to brace said plate against the roof of the tunnel, anchoring of said rear gripper assembly means in the tunnel, and thrusting of said thrust means, and (ii) said link means moves said plate

forward on said roller means during forward movement of said rear gripper assembly means and relative to said stabilizer support and said main frame upon retraction of said plate anchor means, said rear gripper assembly means and said thrust means.

19. The mobile mining machine of claim 15, wherein the acute angle of the pivot axis of said swing boom is between about 10° and about 45° from the vertical axis of said main frame.

20. The mobile mining machine of claim 19, wherein the acute angle of the pivot axis of said swing boom is about 30° from the vertical axis of said main frame.

21. A rolling roof stabilizer for a mobile mining machine having a rear gripper assembly movable on a main frame and having thrust means, said rolling roof stabilizer comprising:

a stabilizer support attached to the top of the main frame;

a plate slidably secured to said stabilizer support by roller means;

plate anchor means between the main frame and said stabilizer support for bracing said plate against the roof of the tunnel upon energizing said plate anchor means; and

link means connecting said plate to the rear gripper assembly whereby (i) the main frame and said stabilizer support move forward on said roller means and relative to said plate upon energizing of said plate anchor means to brace said plate against the roof of the tunnel, anchoring of the rear gripper assembly in the tunnel, and thrusting of the thrust means, and (ii) said link means moves said plate forward on said roller means during forward movement of the

rear gripper assembly and relative to said stabilizer support and the main frame upon retraction of said plate anchor means, the rear gripper ssembly means and the thrust means.

22. A method of cutting a tunnel having a flat floor that is wider than the tunnel roof with a mobile mining machine comprised of a wheel-like cutterhead assembly means for cutting rock having multiple peripherally mounted roller cutter units, means for rotating said cutterhead assembly about its horizontal axis, pitch boom assembly means supporting said cutterhead assembly means and causing vertical movement of said cutterhead assembly means, frame means having a longitudinal axis and a vertical axis perpendicular to the longitudinal axis, swing boom assembly means supported by said frame means and supporting said pitch boom assembly means, said swing boom assembly means having a pivot axis oriented at an acute angle from the vertical axis of said frame means such that said swing boom assembly causes lateral movement of said cutterhead assembly means and said pitch boom assembly means with respect to said frame means, thrust means for thrusting forward as a unit said frame means, said swing boom assembly means, said pitch boom assembly means and said cutterhead assembly means, and holding means for anchoring said mobile mining machine in the tunnel during energizing of said thrust means, said holding means including transport means for locomotion of said mobile mining machine, said method comprising the steps of:

extending said holding means to contact the tunnel walls;

energizing said cutterwheel assembly means to rotate said roller cutter units about the horizontal axis of said cutterwheel assembly means;

energizing said pitch boom assembly means to vary the pitch of said cutterwheel assembly means relative to the tunnel work face;

extending said thrust means to force said frame means forward along the tunnel relative to said holding means;

energizing said swing boom assembly means to sweep said cutterwheel assembly means across the tunnel work face;

retracting said holding means from the tunnel walls; and

retracting said thrust means to draw said holding means forward relative to said frame means.